**Splitting Up Arrays: Part Two**

**(this task builds upon “Splitting Up Arrays: Part One”)**

*Adapted from North Carolina Department of Public Instruction*

**Student Objective:** “I can demonstrate how the distributive property (tiling) works using the concept of area.”

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| **Common Core Standards to Measure** | **Mathematical Practices Addressed** |
| **3.MD.7** Relate area to the operations of multiplication and addition  **c.** Use tiling to show in a concrete case that the area of a rectangle with whole number side lengths *a* and *b + c* is the sum of *a x b* and *a x c.* Use area models to represent the distributive property in mathematical thinking. | #4 Model with mathematics.  #6 Attend to precision.  #7 Look for and make use of structure.  #8 Look for and express regularity in  repeated reasoning. |

**Materials:**

“Splitting Apart Arrays II” Sheet

“Break It Apart” Sheet

12-24 Inch Color Tiles per pair

Rulers

1 Marker or Crayon per student

Interactive Notebook (if used)

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| G  **Engage Students with the Goal** | State and Rate  Objective: “I can demonstrate how the distributive property (tiling)works using the concept of area.”  Students rate themselves to the goal (1, 2, 3, 4). | Setting Objectives and Providing Feedback |
| A  **Access Prior**  **Knowledge** | *This lesson builds on the previous one by having students split apart the larger array to four smaller arrays. The splitting apart of the array will bring out the conversation about the distributive property.*  Start a discussion with students:  *Yesterday, we broke apart (decomposed) larger numbers into smaller numbers to multiply, then added the products to find the answer. For example, if Maria did not know the fact and wanted to find the area of a room that was 8 feet wide and 6 feet long, how could she break apart the numbers to make easier facts?*  Have students respond in their interactive notebooks. When finished, ask students to discuss with a partner and then share out their responses.  Possible responses may include:  -Break apart the 8 and keep the 6 whole (e.g. 7 x 6 + 1 x 6)  -Keep the 8 whole and break up the 6 (e.g. 8 x 5 + 7 x 1)  Continue to ask for responses until a few different combinations have been found.  Ask: *Will all of these expressions result in the same answer? How do we know?* Allow students to choose an expression to talk through step-by-step to prove that 7 x 6 is equal to the sum of two smaller arrays. | Cues, Questions, and Advance Organizers  Homework and Practice  Cooperative Learning |
| N  **New Information** | *This part of the lesson goes through the steps that they will need to follow the application part of the lesson. In the application part of the lesson, students A and B will alternate building arrays and separating them with the ruler.*  Pair students and allow them to determine Student A and Student B. Distribute color tiles and rulers.  Introduce the activity:   * Student A uses the tiles to build a 4 x 6 array * Student B uses the ruler to make one vertical separation and one horizontal separation in the array, creating 4 smaller arrays * Both students determine and record the dimensions of each small array * The students add up the products to determine if the final product matches the original array.   Have students try the activity and record their findings in their interactive notebooks. Facilitate a discussion by asking:  -*What are the dimensions of the arrays that you found?*  *-Will all of these arrays result in the same sum? How can we be sure?*  Have students take notes of different ways to split the arrays in their notebooks. | Cooperative Learning  Summarizing and Note-Taking  Homework and Practice |
| A  **Application** | *In the application part of the lesson, students will continue to work in a similar fashion with the “Splitting Apart Arrays II” sheet. Encourage students to use tiles even if they have discovered a pattern to help them. Not all Split-Aparts can be done with each number of tiles.*  Pass out the “Splitting Apart Arrays II” sheet. Review the directions and the roles. Give students time to work through the activity.  Pass out grid paper and the “Break It Apart” sheet. Ask students to use the marker and ruler to split apart each grid into four smaller arrays. Have them record the dimensions and products for each array on the grid. Tell students to add the products in the margin to find the area of the entire array. | Homework and Practice  Cooperative Learning  Generating and Testing Hypotheses  Providing Feedback |
| G  **Revisit the Goal** | Have students write a statement of learning in their interactive notebooks/journals using words and pictures. Have students share their entry with other students.  State and Rate  Objective: “I can demonstrate how the distributive property (tiling) works using the concept of area.”  Students rate themselves to the goal (1, 2, 3, 4). | Setting Objectives and Providing Feedback  Summarizing and Note-Taking |

**Evaluation:**

**Formative**- As students work, pose questions and observe them.

**Summative**- Collect student work.

**Differentiation:**

**Intervention-** Student may need to complete the “Splitting Apart Arrays II” activity in a small group with a teacher.

**Extension-** Students may choose another number from the sheet to complete the activity.

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Splitting Apart Arrays II**

Chose the number of tiles you will use for this activity and circle the number:

12 14 16 18 20 21 22 24

Count out the number of tiles you need. You will only use these tiles.

Complete the chart by writing the equation and answer for each smaller array:

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|  | Array 1 | Array 2 | Array 3 | Array 4 |
| Split Apart 1 |  |  |  |  |
| Split Apart 2 |  |  |  |  |
| Split Apart 3 |  |  |  |  |
| Split Apart 4 |  |  |  |  |
| Split Apart 5 |  |  |  |  |
| Split Apart 6 |  |  |  |  |
| Split Apart 7 |  |  |  |  |
| Split Apart 8 |  |  |  |  |
| Split Apart 9 |  |  |  |  |
| Split Apart 10 |  |  |  |  |
| Split Apart 11 |  |  |  |  |
| Split Apart 12 |  |  |  |  |

Show how to separate the following array into four smaller arrays.

Label and find the area of each array that you create.

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Area \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Show your thinking:

If you have extra time, pick another number of tiles and work on breaking array apart in different ways.

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Break It Apart**

Separate each grid into two smaller arrays.

Label each array.

Show how to find the area of the grid.

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Separate each grid into four smaller arrays.

Label each array.

Show how to find the area of the grid.

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